A Metadata-based Need-to-Know Engine as Part of Standard Content Management Software

Bruce Lownsbery, Deputy Project Leader

LLNL's Nuclear Weapons Information Project

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NWIP

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Outline

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NWC NTK Vision and Architecture

Within DOE's Nuclear Weapons Complex, we want seamless and ubiquitous access (or denial) to information based on the information content and user's credentials

Implemented as distributed but compatible services to:

- Authenticate users and processes
- Validate authorization to resources
- Deliver information securely
- Audit NTK processes

Progress

- **DOE's NWC has worked NTK issues for several years**
  - NWC NTK Architecture approved as good general approach
  - Lots of debate over granularity required and access modes
  - Was no commercial option so NTK Engine prototype developed at LLNL
- **LLNL requested "metadata-based" NTK in product**
  - IntraNet Solutions caught our vision and implemented NTK as add-on when we bought another copy of Xpedio product at list price ($150K).
  - Prototype delivered in <4 months – took 3 more to become released product in June 2000. Ongoing development.
  - Developed product module is free to all US Government organizations

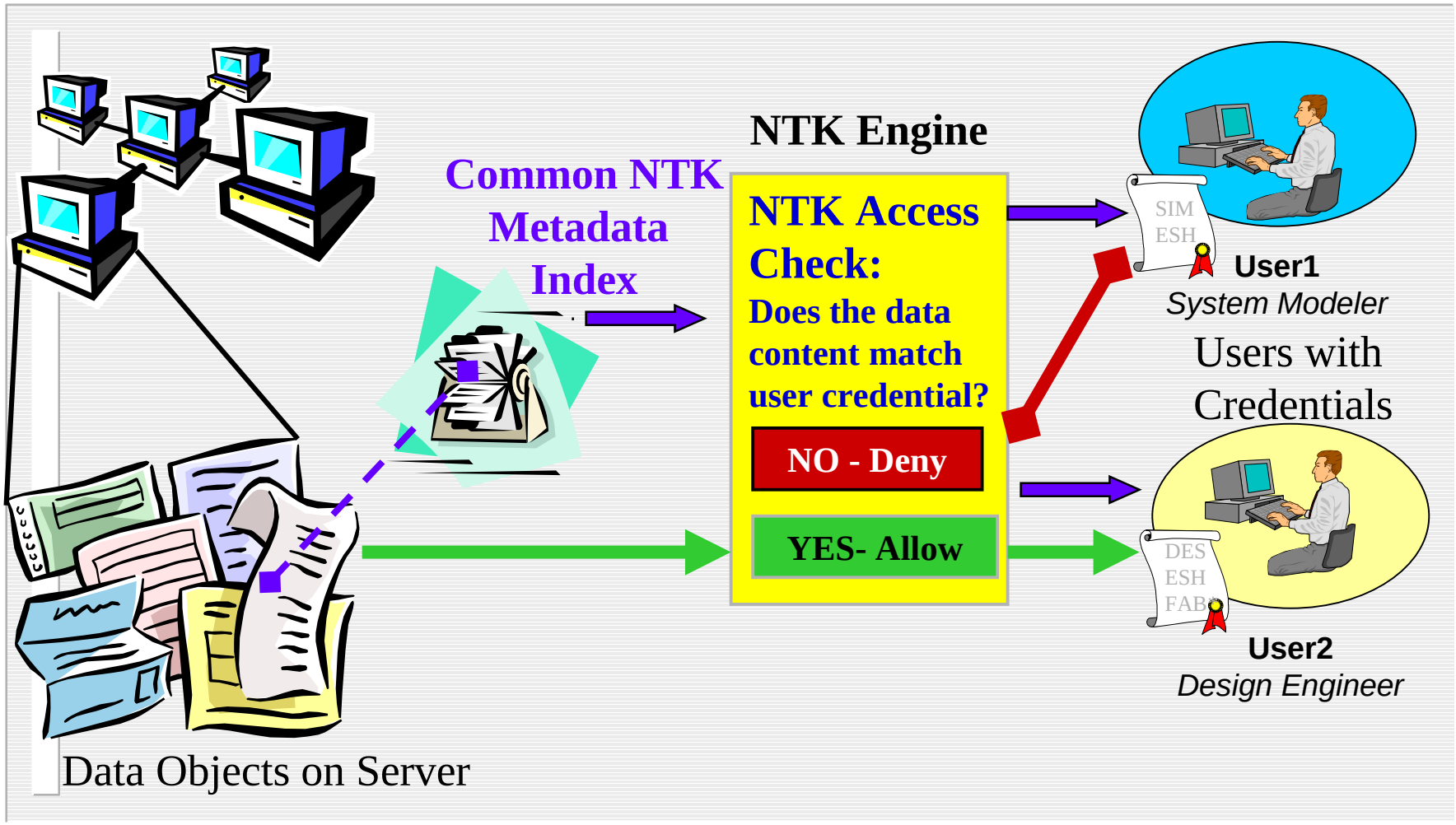
NTK Access Control Modes

- **Discretionary access**
  User determines if a recipient has proper need-to-know
  Implemented with personal transfer of information
- **Structured access**
  Need-to-know “predefined” by resource owner –
  bins of users and content
  Implemented by groups, accounts, access control lists, partitioned network connections
- **Content-based access**
  NTK defined by user’s credential and metadata characterizing content
  LLNL NTK engine prototype matches certain fields

IntraNet Solutions' Implementation

- **Extend structured mode to metadata-based access in Xpedio Content Server**
- NTK defined by user's credential and metadata characterizing the content
- Commercial NTK Engine runs arbitrarily complex queries
- **Integrated end-to-end solution for:**
  metadata, content, and user credential management
  with search and browse access in a WWW environment
  imposing flexible and powerful NTK control
- Potential front-end for other back-end data repositories and externally managed user credentials

Metadata-based NTK Mechanism (Generalizing Content-based NTK)

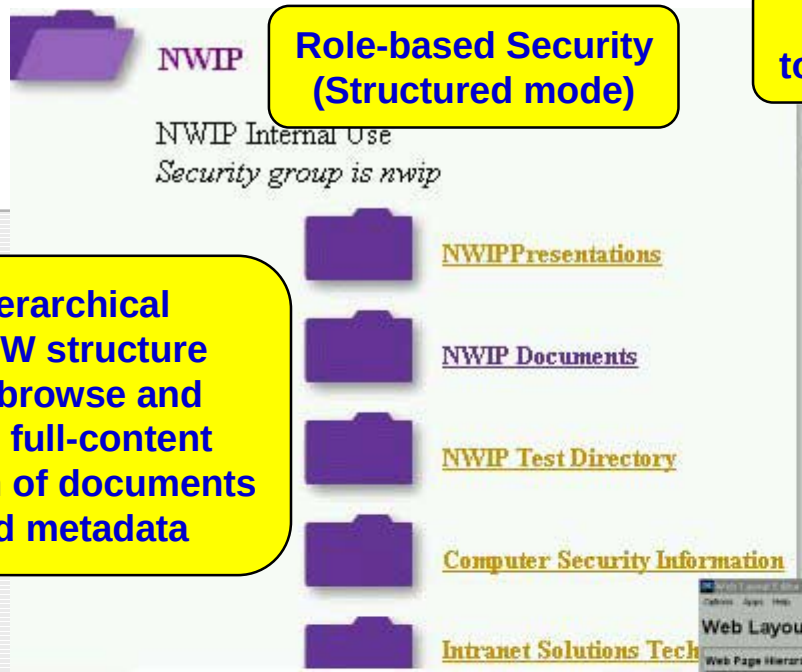


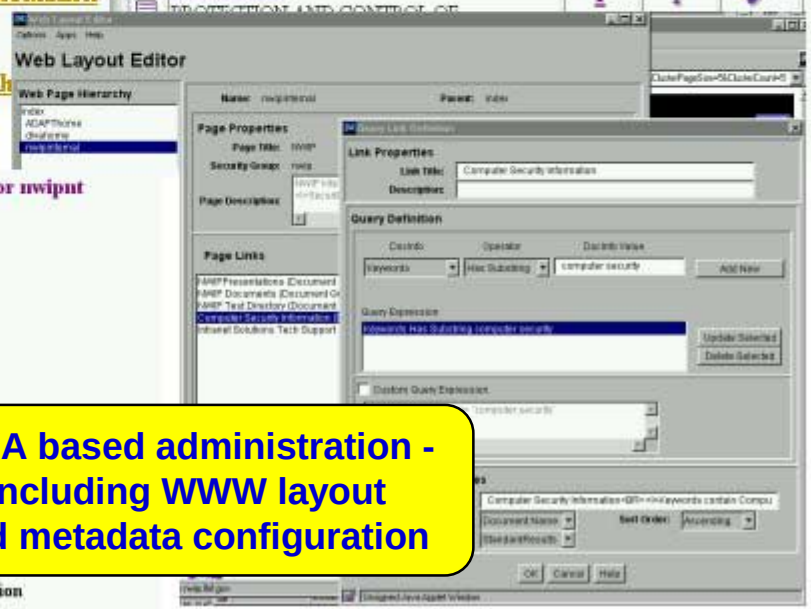
Xpedio Metadata and Document Management

Role-based Security (Structured mode)

Query based assignment of documents to contexts with automatic publishing to WWW

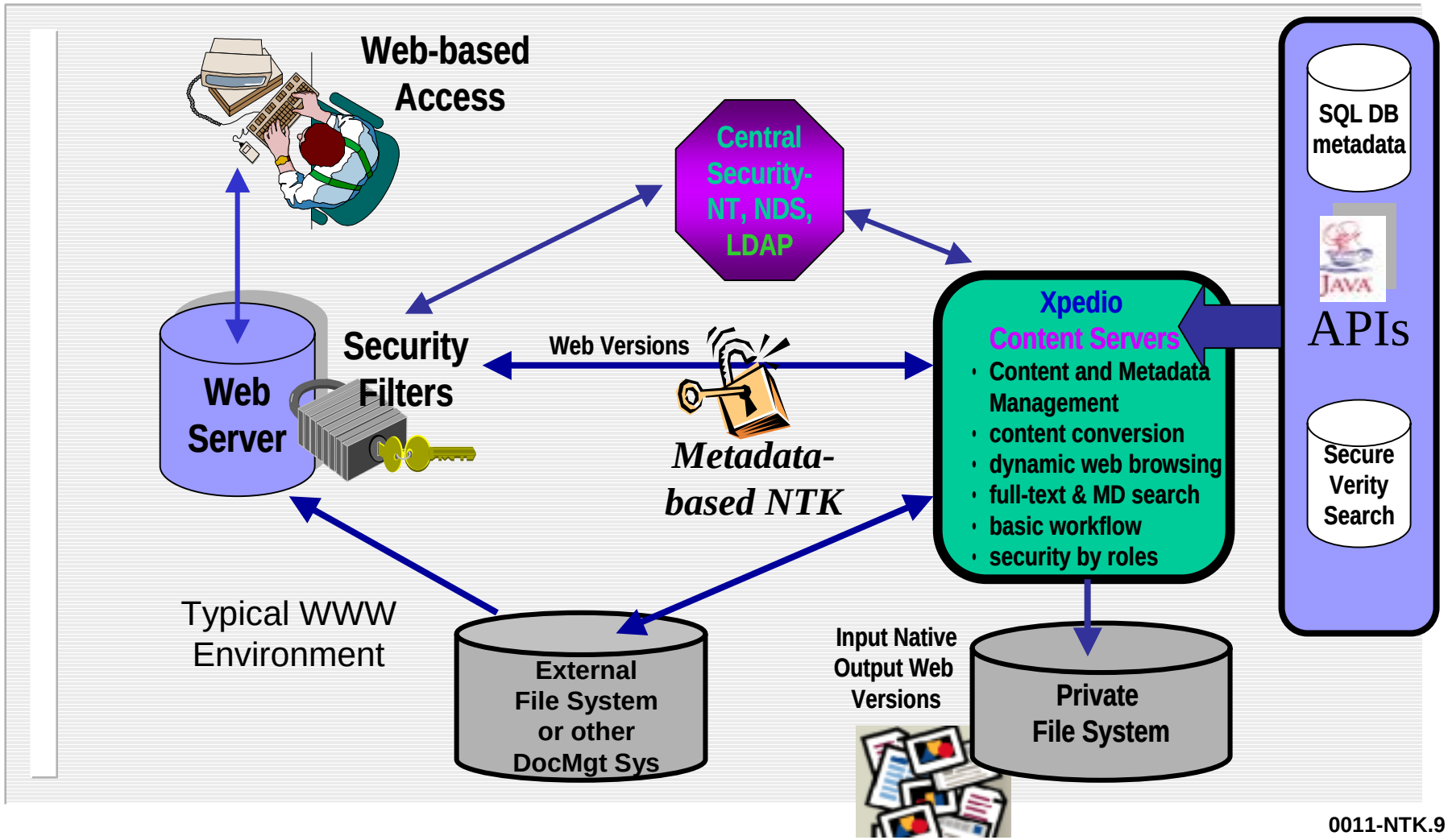
Hierarchical WWW structure for browse and also full-content search of documents and metadata



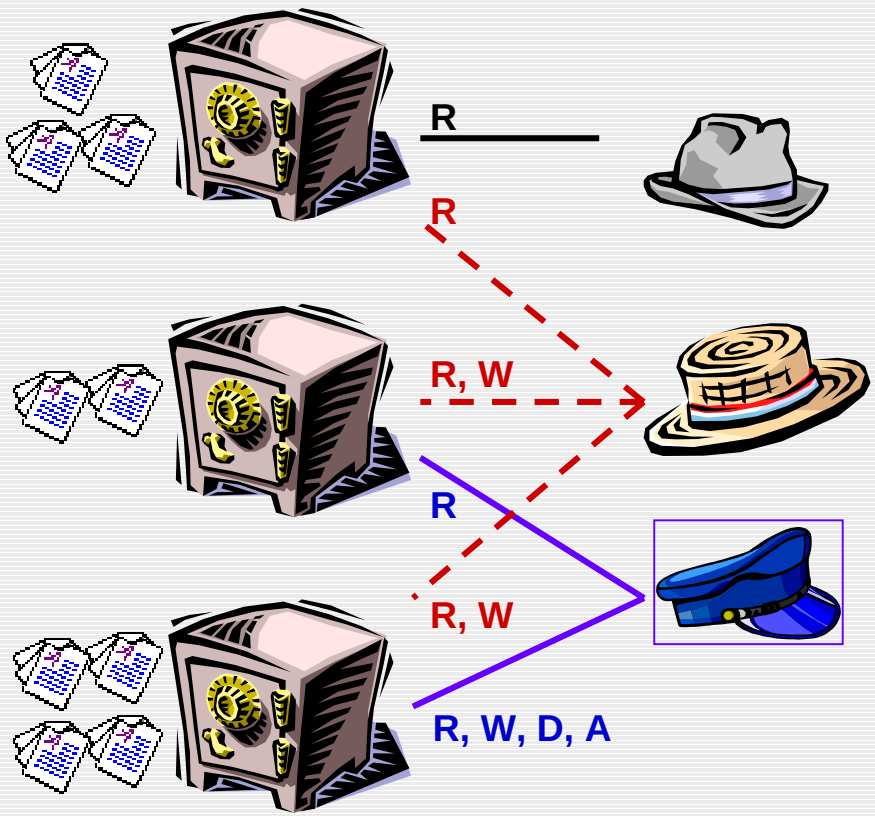


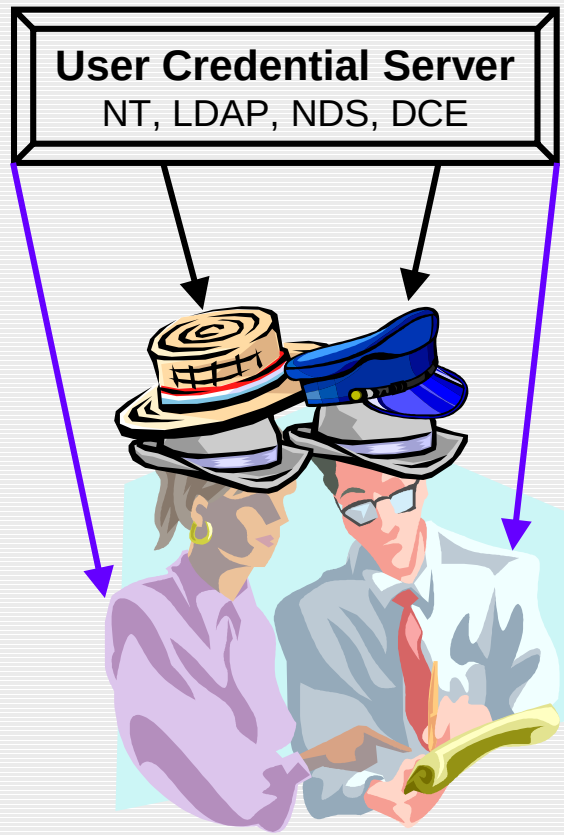
JAVA based administration - including WWW layout and metadata configuration

Existing Xpedio Architecture Readily Incorporated NTK Control



Xpedio Standard ‘Structured-Mode’



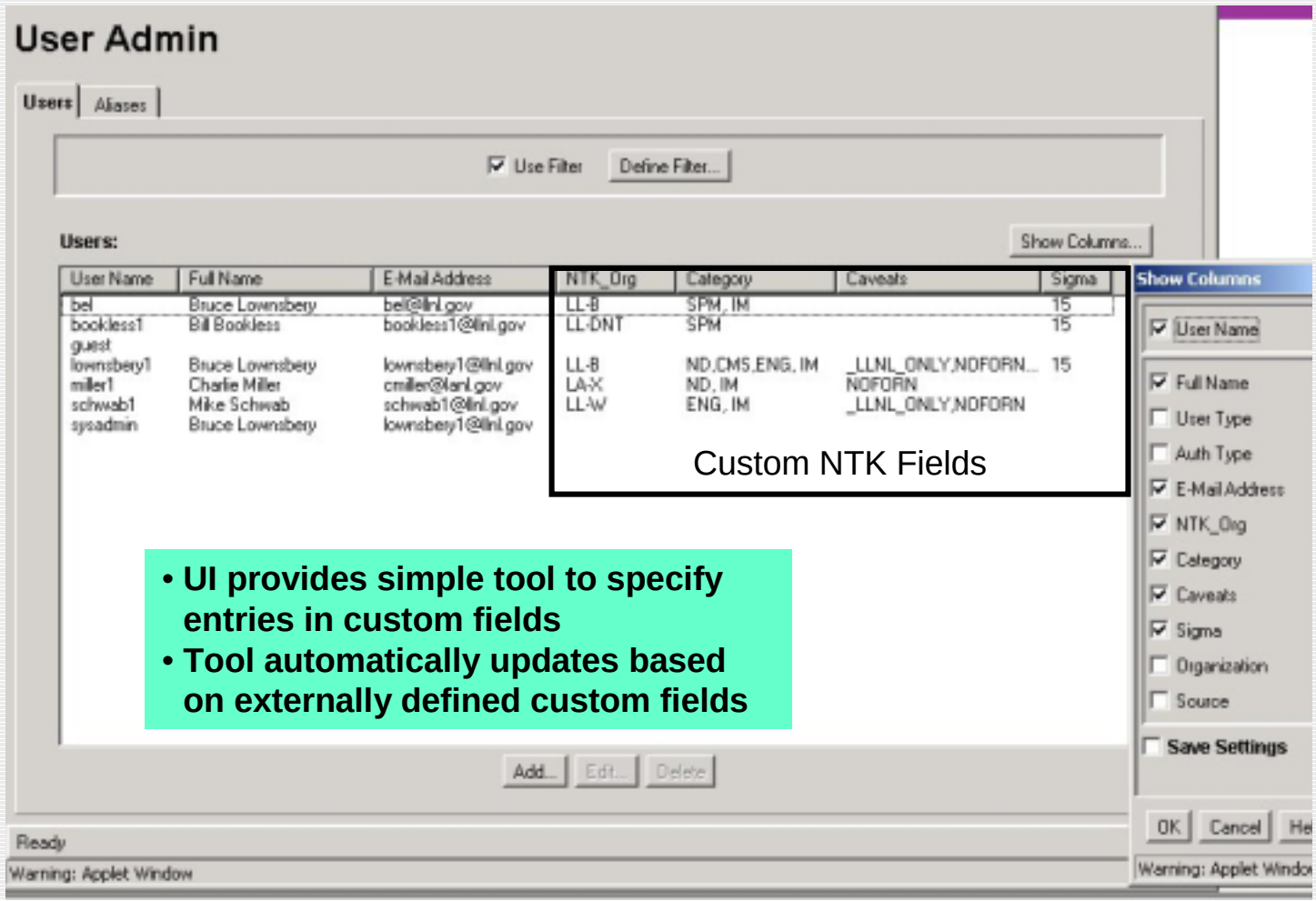


- Documents assigned to 1 Security Group
- Roles have various permissions on Groups
- Users assigned 1 or more Roles
  (may be mapped from external credentials)

Xpedio Metadata-based NTK Implementation

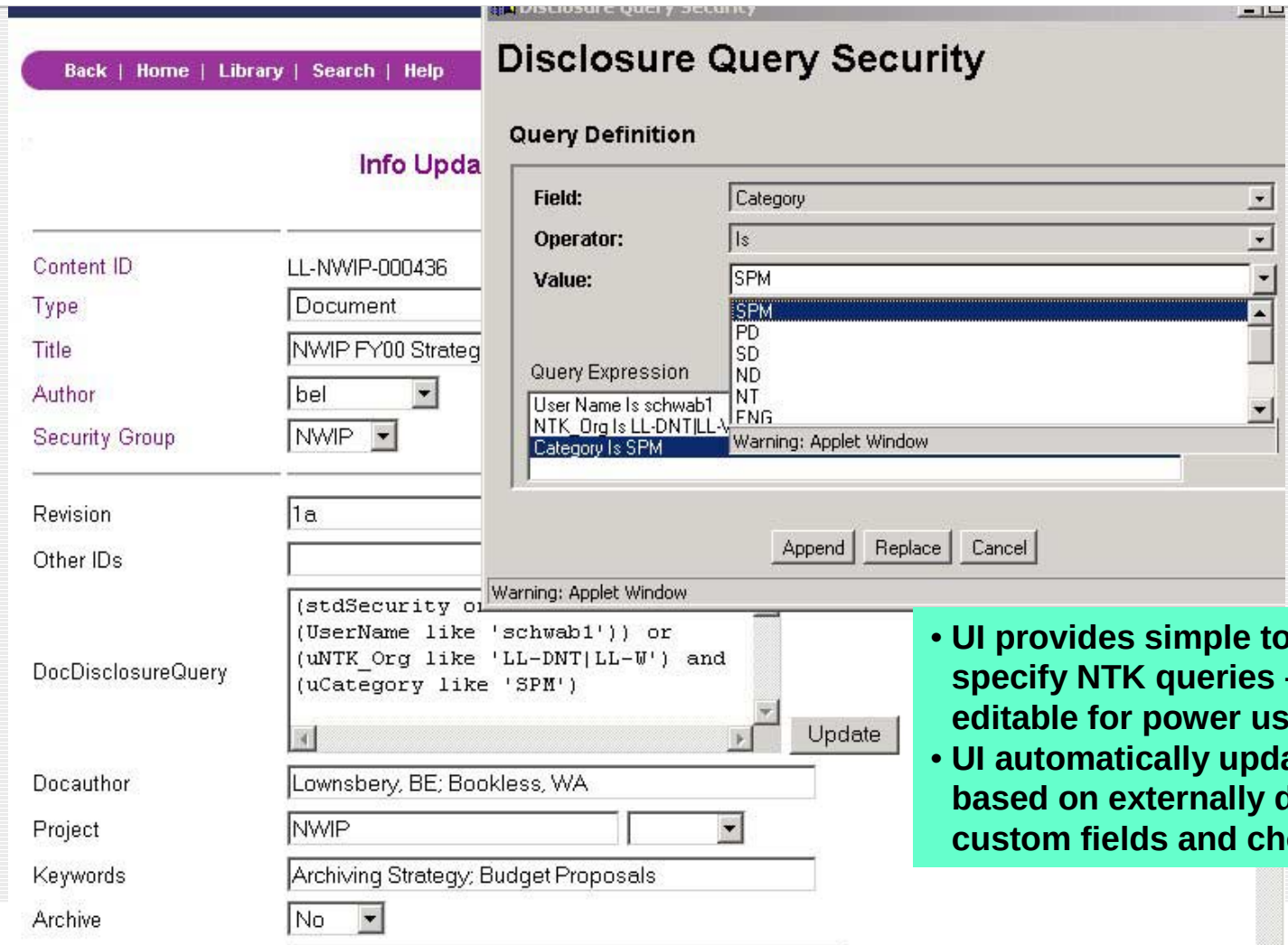
- **Functionality and GUI changes implemented with add-on 'component'**
  - Externally defined fields for access control check between user and content
  - *Demo will use: NTK_Organization, Category, Caveats, and Sigmas along with Usernames and/or Roles to control access*
  - Changes GUI for user credential and GUI for metadata entry
  - Installs in minutes. Disabling reverts to standard structured mode
- **Subset of metadata for selected security groups shown to all users**
  - Metadata subset controlled by search results template
  - GUI for selecting groups for metadata exposure
  - *Implemented via read privilege for 'hitlist' role*
- **NTK Query applied only to specified groups**
  - Configuration files identifies applicable security groups
  - NTK query stored in database field – could be interactive or computed
  - GUI for specifying simple queries – then fully editable
  - Null query defaults to standard security for smooth transition
  - Can expand or restrict Read access (doesn't affect those with Write privilege)
- **Changes to access are nearly instantaneous**

Xpedio User Admin Extended With NTK Fields



- **UI provides simple tool to specify entries in custom fields**
- **Tool automatically updates based on externally defined custom fields**

Xpedio Metadata Entry Extended With NTK Specification Applet



- **UI provides simple tool to specify NTK queries – fully editable for power user**
- **UI automatically updates based on externally defined custom fields and choice lists**

Xpedio NTK Demo

- **Open user administration to show user credentials**
  - GUI for structured-mode roles and associated group privileges
  - GUI for changing NTK field values
  - GUI for specifying metadata exposure – NWIP group
- **Log in as users with various privilege and see effects**
  - User ‘bel’ with Administrator privilege for global access
  - User ‘lownsbery1’ without general read privilege in NWIP group
- **Change metadata exposure and see effect – toggle NWIP group**
- **Change NTK to allow access where previously excluded - via custom field, username, or role combination**
  - Add category ‘IM’ to lownsbery1 credential
    and/or
  - Add lownsbery1 and/or ‘public’ role to document access criteria